Instructions For Use
ENGLISH

Koser Citrate Medium

For the differentiation of coliforms on the basis of citrate utilization.

INTENDED PURPOSE

Differential medium for presumptive Enterobacteria identification. This medium is intended as an aid in the identification tests to complete the diagnostic results.

DESCRIPTION

Koser Citrate Medium is a liquid medium originally developed by Koser for differentiating *Escherichia coli* from the *Enterobacter* "colon-aerogenes" group. It is used with organisms isolated from laboratory specimens, water samples, and food samples.

This medium is among a set of IMViC Tests (Indole, Methyl-Red, Vogues-Proskauer, and Citrate) that are used to differentiate among the gram-negative bacilli in the family Enterobacteriaceae as described in the FDA-BAM method for enumeration of *E. coli* and coliform bacteria.

TYPICAL FORMULA*	(g/litre)
Sodium Citrate	3.0
Sodium Ammonium Phosphate	1.5
Potassium Phosphate (monobasic)	1.0
Magnesium Sulfate	0.2
Final pH 6.7 ± 0.2 at 25°C	

*Adjusted and/or supplemented as required to meet performance specifications.

METHOD PRINCIPLE

Sodium citrate allows growth of organisms such as *Klebsiella aerogenes* (*Enterobacter aerogenes*) and *Enterobacter cloacae* which are capable of utilizing citrate as the only source of carbon. Other organisms that cannot metabolise citrate, like *Escherichia coli,* will not grow in this medium. Sodium ammonium phosphate and magnesium sulphate provide nitrogen and magnesium ions, respectively. Monopotassium phosphate acts as a buffer.

PREPARATION

Dehydrated medium

Suspend 5.7 g of the powder in 1 liter of distilled or deionized water. Mix well and heat shaking frequently until completely dissolved. Dispense into screw-cap tubes. Sterilize in autoclave at 121°C for 15 minutes.

MATERIALS REQUIRED BUT NOT PROVIDED

Standard microbiological supplies and equipment such as: Autoclave, water bath, test tubes, inoculating loops, swabs, incubator, quality control organisms.

SPECIMENS

Specimens should be obtained before antimicrobial therapy (where possible) and promptly delivered to the laboratory for examination. Refer to specific guidelines for more detailed information.

TEST PROCEDURE

Allow tubes to warm up to room temperature prior to inoculation.

Inoculate the medium using a fresh (16-18 h) pure culture of the test organism.

Incubate tubes at 35 ± 2°C for 18-24 h with caps slightly loosened.

INTERPRETING RESULTS

Tubes with marked turbidity are considered positive for the *Enterobacter* group.

E. coli will be inhibited showing no difference in comparison to a control tube (uninoculated).

Note: further biochemical tests should be performed to confirm presumptive positive organisms identified with this medium.

STORAGE

The powder is very hygroscopic, store the powder at 10-30°C, in a dry environment, in its original container tightly closed. Do not use the product beyond its expiry date on the label or if product shows any evidence of contamination or any sign of deterioration.

SHELF LIFE

Dehydrated medium: 4 years.

QUALITY CONTROL

Appearance of Dehydrated Medium: Free-flowing, homogeneous, white.

Appearance of Prepared Medium: Clear solution, colorless.

Expected Cultural Response:

Control strain		Inoculum	Incubation	Criteria
Enterobacter cloacae	WDCM 00082 (ATCC® 23355; NCTC 13380)	≤100 CFU	18-24 h / 35 ± 2°C	Good growth
Klebsiella aerogenes (formerly *Enterobacter aerogenes*)	WDCM 00175 (ATCC® 13048; NCTC 10006)			
Klebsiella pneumoniae	WDCM 00097 (ATCC® 13883; NCTC 9633)	>10^3 CFU		None or poor growth
Escherichia coli	WDCM 00013 (ATCC® 25922; NCTC 12241)			

Please refer to the actual batch related Certificate of Analysis (CoA).

PERFORMANCE CHARACTERISTICS

Performance testing of Koser Citrate Medium was carried out using the QC strains listed above. The results obtained met the established criteria.

LIMITATIONS

Invalid results can be caused by poor specimen quality, improper sample collection, improper transportation, improper laboratory processing, or a limitation of the testing technology. The operator should understand the principles of the procedures, including its performance limitations, in advance of operation to avoid potential mistakes.

Due to nutritional variation, some strains may result in poor growth or fail to grow on this medium.

Liquid medium can appear turbid when a large inoculum is used, even if there is no growth.

Koser Citrate Medium is intended as an aid in the diagnosis of infectious diseases, requiring further tests to complete the diagnostic results. All identification tests should ideally be performed from non-selective agar.

WARNING AND PRECAUTIONS

1) **For *in vitro* diagnostic use (IVD).**
2) **For laboratory professional use only.**
3) Operators must be trained and have certain experience. Please read the instructions carefully before using the product. Reliability of assay results cannot be guaranteed if there are any deviations from the instructions in this document.
4) Consult the Safety Data Sheet (SDS) for information regarding hazards and safe handling practices.
5) Do not use if the product or packaging appears to be damaged.
6) Follow standard precautions. All patient specimens should be considered potentially infectious and handled accordingly.
7) Handle all specimens as if infectious using safe laboratory procedures. Dispose of hazardous or biologically contaminated materials according to the practices of your institution.
8) Avoid cross-contamination of samples by using disposable tips and changing them after each sample.
9) Do not mix reagents of different batches. Please use the product within the validity period.
10) Do not eat, drink, smoke, apply cosmetics or handle contact lenses in areas where reagents and human specimens are handled
11) Results should be interpreted by a trained professional in conjunction with the patient's history and clinical signs and symptoms, and epidemiological risk factors.
12) Ensure laboratory equipment is calibrated and maintained in accordance with the laboratory's procedure.
13) When test results are transmitted from the laboratory to an informatics centre, attention has to be done to avoid erroneous data transfer.

DISPOSAL OF WASTE

Disposal of waste must be carried out according to national and local regulations in force.

BIBLIOGRAPHY

See the references at the end of this document.

TABLE OF SYMBOLS

See the table of symbols at the end of this document.

See available configurations below. There may be additional product ref. numbers as well. For an updated listing of available products, visit **liofilchem.com**

Product	Format	Packaging	Ref.
Koser Citrate Medium	Dehydrated media	500 g	610165

Significant changes from previous version:

Document	Release Date	Change Summary
610165_IFU(0)	2022-10-14	Document creation (layout and content in compliance with IVDR 2017/746)

This IFU document and the SDS are available from the online Support Center:

liofilchem.com/ifu-sds

References

1. U.S. Food and Drug Administration. Bacteriological Analytical Manual (BAM) Chapter 4: Enumeration of Escherichia coli and the Coliform Bacteria (2020-10-09). https://www.fda.gov/food/laboratory-methods-food/bam-chapter-4-enumeration-escherichia-coli-and-coliform-bacteria
2. BAM Media M72: Koser's Citrate Broth (2017-10-17). https://www.fda.gov/food/laboratory-methods-food/bam-media-m72-kosers-citrate-broth
3. Eaton AD, Clesceri LS, and Greenberg AE (2017) Standard methods for the examination of water and wastewater, 23rd ed. American Public Health Association, Washington, D.C.
4. APHA (2015): Compendium of Methods for the Microbiological Examination of Foods. 5th ed. American Public Health Association, Washington, D.C.
5. ASM Citrate Test Protocol (2009-12-08). https://asm.org/ASM/media/Protocol-Images/Citrate-Test-Protocol.pdf?ext=.pdf
6. Koser SA, (1923) Utilization of the salts of organic acids by the colony-aerogenes group. J. Bacteriol. 8:493-520. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC379032/pdf/jbacter01058-0074.pdf

Table of Symbols

LOT	Batch code
REF	Catalogue number
IVD	*In Vitro* Diagnostic Medical Device
	Manufacturer
	Use by
	Fragile, handle with care
	Temperature limitation
	Contains sufficient for <n> tests
	Consult instructions for use
	Do not reuse
	Keep away from sunlight

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